

Heart, heal themselves

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A group of researchers from University College London made a splash this week with their work prodding heart muscle to repair itself. This is big news, given both the number of people who have heart attacks (more than 1 million per year in the US) and the number of stem cell scientists working to regenerate the damage (23 awards worth \$46 million from CIRM).

The big problem has been this: The heart appears to have some stem-like cells, but in adults they don't do much. They certainly aren't able to repair damage after a heart attack. When the heart is developing, however, those cells are the major source of new heart muscle. So, what gives? Why can't those cells perform in adults the way they do during development?

A story by Mitch Leslie in ScienceNOW has this to say about the UCL work:

“ To recapture the cells' youthful vigor, the researchers injected mice with thymosin β^4 , a compound already undergoing clinical trials as a heart attack treatment because it helps cardiomyocytes survive and spurs the growth of new blood vessels. The researchers then mimicked a heart attack in the animals by tying off one of the arteries that deliver blood to the heart, injuring part of the muscle.

Unlike control mice that didn't appear to fashion any new cardiomyocytes, animals dosed with thymosin β^4 made some of the cells, the team reports online today in Nature. The cells infiltrated the damaged zone left by the simulated heart attack and meshed with other cardiomyocytes physically and electrically, allowing them to beat. They also seemed to prevent some of the damage that can result from a heart attack. Magnetic resonance imaging scans showed that the hearts of mice that had received thymosin β^4 had smaller scars and were able to pump more blood with each contraction than were the hearts of untreated rodents.

The news is good, but thymosin β^4 wasn't all that efficient. The group is hoping to find other compounds that can more effectively prod progenitors into action.

This work is interesting, too, because it shows the interplay between stem cell science and traditional drug-based medicine. Transplantation therapies are what grab the stem cell headlines. But studying how stem cells normally function can also lead to the development of new drugs, such as ones that could help the heart heal itself.

The ScienceNOW story quotes CIRM grantee Deepak Srivastava, who made headlines last year when he was able to directly transform support cells in the heart into heart muscle - a trick he'd like to replicated not in a lab dish but in an actual heart.

“ The study "provides strong evidence that there is a population of cells from the epicardium that can turn into new muscle," Srivastava says. "The real question is how robust is the process [of cell transformation] and how can it be improved." He recommends that researchers also investigate whether the cells can rebuild cardiac muscle during heart failure, a condition that afflicts some 5 million U.S. residents and causes the organ to progressively weaken.

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